



Figure 1

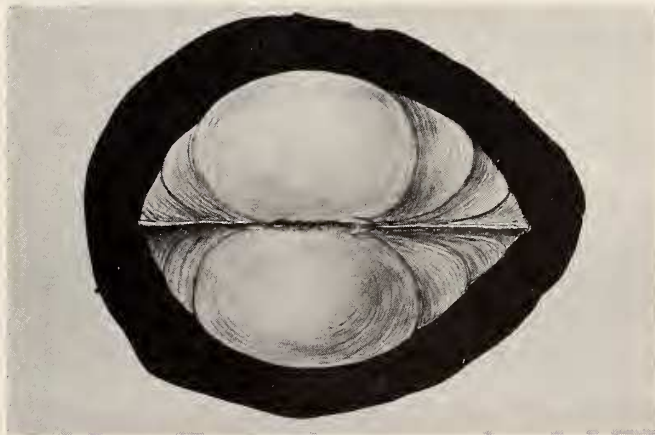


Figure 2

*Pisidium obtusale* PFEIFFER form *rotundatum* PRIME (type specimen of *P. tremperi* HANNIBAL), x 27.  
Bluff Lake, San Bernardino Mountains, San Bernardino County, California.



Known only from the San Bernardino Mountains (Berry, 1919; Pilsbry, 1948, p. 987).

*Vertigo occidentalis* Sterki. Known only from the San Bernardino Mountains (Pilsbry, 1948, p. 993).

Hannibal (1912a, pp. 40-42) accounted for the aquatic species in the Pacific Coast drainage by stream capture of former Mojave headwaters. Pleistocene uplift of the San Bernardino and San Gabriel Mountains, and the recent origin of the present Mojave stream courses are documented geologically (Noble, 1954; Bowen, 1954). From this point of view, Hannibal's interpretation is plausible. Another zoogeographic question remains unanswered, however: Why are these local populations of mollusks (some differentiated, some not) in the San Bernardino Mountains? Their isolation and differentiation may considerably antedate recent drainage changes. The occurrence of these species in the coastal drainage may therefore be a relatively minor geographic phenomenon superimposed on the older biological feature of local isolation.

In the case of *Valvata*, one can say that the history of the species in southern California is more complicated than appears at first sight. Although the only known living occurrences are in the Bear Lake area of the headwaters of the Santa Ana in the San Bernardino Mountains, this snail is known as an upper Pleistocene fossil from the Palos Verdes Sand in what is now Los Angeles River drainage (Woodring and others, 1946, p. 65). Evidently the restriction of *Valvata* in southern California to the San Bernardino Mountains is a relatively recent feature of its distribution. Probably its local occurrence is due to the disappearance of other formerly suitable habitats. Whether *Pisidium obtusale* is analogous to the *Valvata* in this respect, one cannot say.

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